## Thermal Gap Conductance: An Experimental Investigation - the Interstitial Fluid Between the Rough Surfaces is a Mixture of Gas Layer

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An experimental investigation is undertaken to find the effect on contact conductance when the interface contains a mixture of gases. Experiments were performed to measure gap conductance for a number of stainless steel 304 pairs over a range of surface roughness and gas mixture ratios at around atmospheric pressure. The mixture employed as the interstitial gas consists of high purity helium (99.999%) and high purity argon (99.99%) mixed in specified proportions. The heat transfer across the interface depends on the gap size, gas composition in the gap, temperature at the interface and contact pressure. For rougher surfaces with minimal contact pressure, the gas gap conduction predominates. It is observed that the use of higher thermal conductivity gases do not necessarily increase the gap thermal conductance because it depends on the accommodation coefficients as well. For example helium with a high thermal conductivity compared with argon has a lower thermal accommodation coefficient due to its low molecular weight. It is evident that energy transfer also depends on mixture ratio of the various gases. Experimental data currently being obtained will be compared with the published theories and the results will be incorporated into the final manuscript.